

March 10, 1964

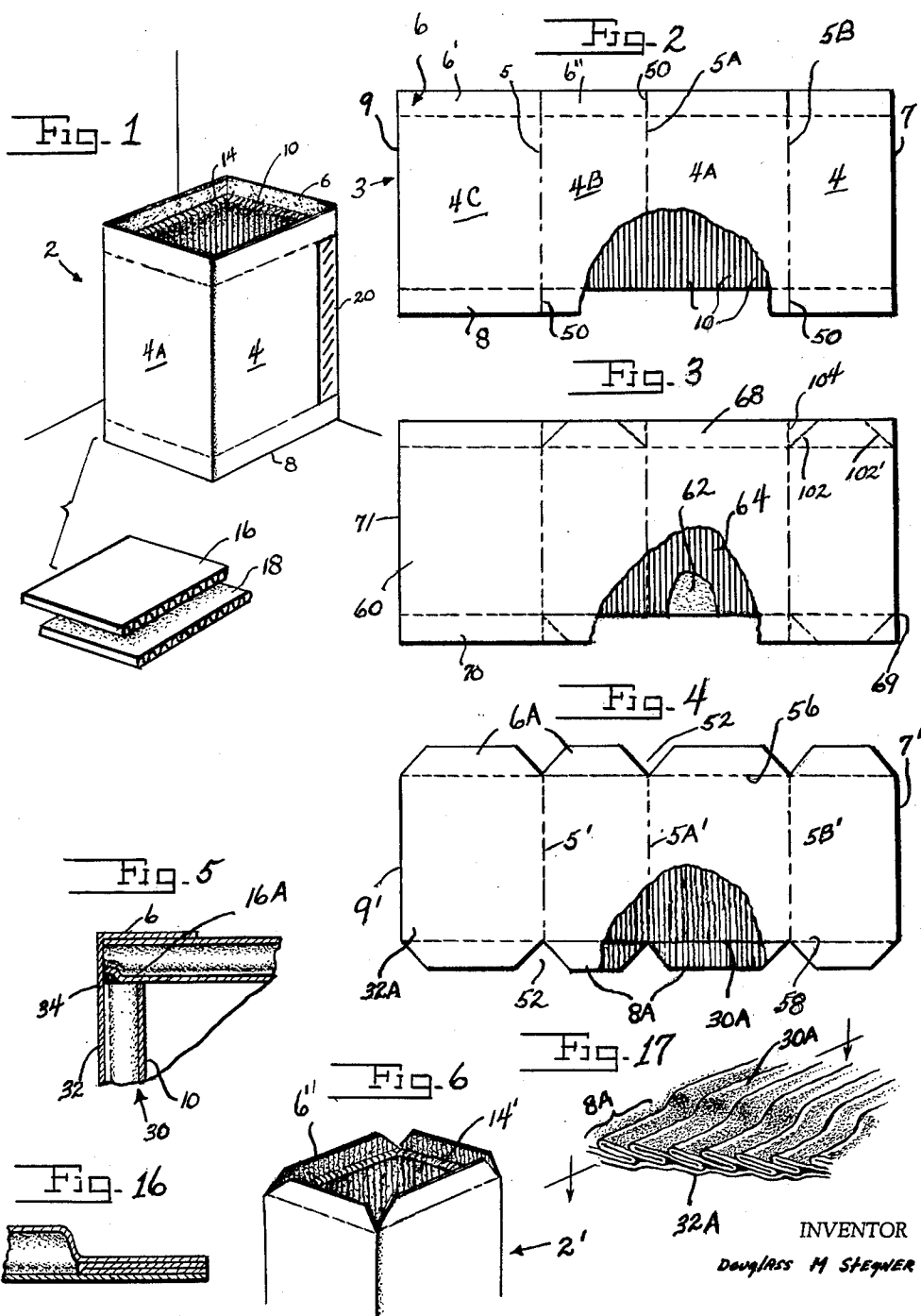
D. M. STEGNER

3,124,292

BOX STRUCTURE

Filed March 20, 1962

3 Sheets-Sheet 1.



INVENTOR
DOUGLASS M. STEGNER

BY

Joel & Davidson

ATTORNEYS

March 10, 1964

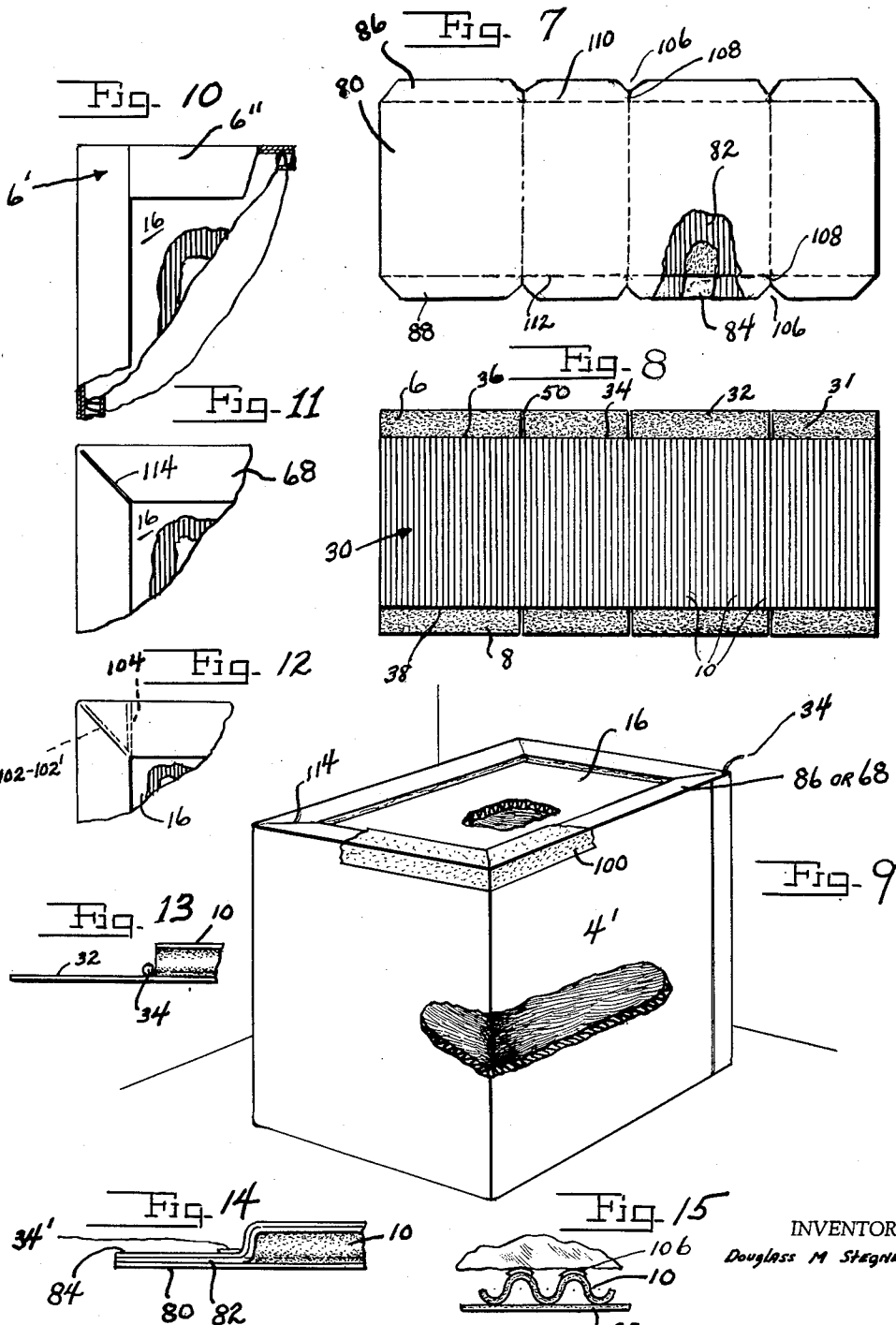
D. M. STEGNER

3,124,292

BOX STRUCTURE

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3 Sheets-Sheet 2



INVENTOR

Douglas M Stegner

BY

Jacobi & Faudon

ATTORNEYS

March 10, 1964

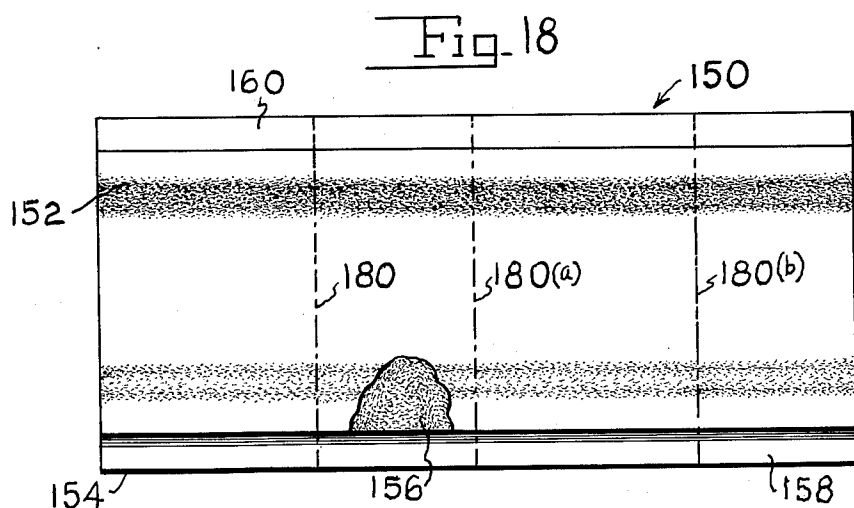
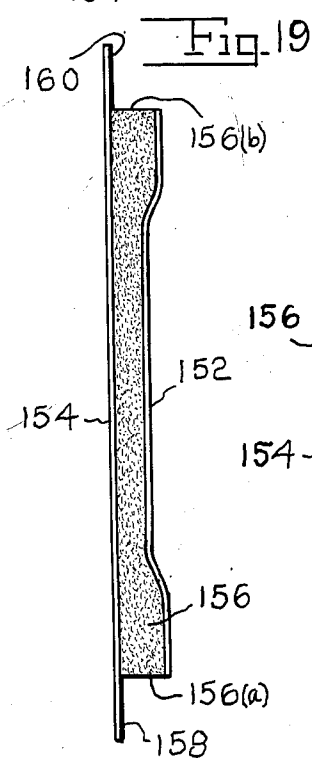
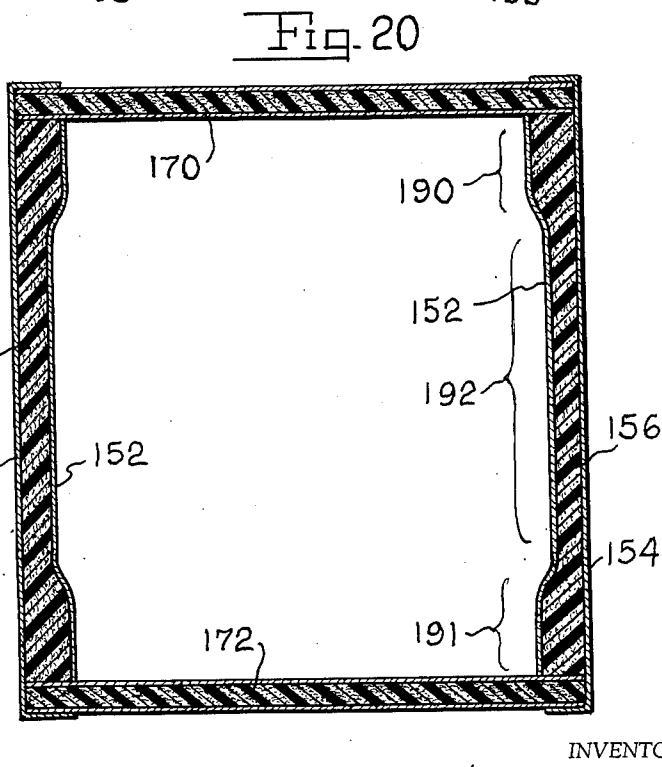
D. M. STEGNER

3,124,292

BOX STRUCTURE

Filed March 20, 1962

3 Sheets-Sheet 3



INVENTOR
Douglass M Stegner

BY *Jacobi & Davidson*

ATTORNEYS

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3,124,292

BOX STRUCTURE

Douglass Miller Stegner, Baltimore, Md., assignor to
Baltimore Box Company, Baltimore, Md., a corpora-
tion of Virginia

Filed Mar. 20, 1962, Ser. No. 181,518

7 Claims. (Cl. 229-14)

This application is a continuation-in-part of my co-
pending application, Serial No. 167,599, filed January 22,
1962, now abandoned.

This invention relates to boxes and is particularly con-
cerned with boxes and box blanks formed basically of
paperboard.

Generally, what is called "corrugated paperboard" has
found widespread use in the construction of shipping
cartons and the like, primarily because it provides the
needed strength for the least cost. However, the term
"corrugated paperboard" covers what is known in the
trade as "double face" corrugated stock, what is known
in the trade as "single face" corrugated stock; and is
often used as generically designating stock having a foam
in place of the conventional corrugating layer. Single
face stock comprises an outer flat facing layer and an
inner ruffled or corrugated layer fixed to the outer layer
by a suitable adhesive. Double face stock, on the other
hand, comprises an outer facing layer, an inner corrugated
layer fixed thereto, and additionally an inner flat facing
layer also fixed to the corrugations so that the outer and
inner facing layers form effectively a sandwich on op-
posite sides of the corrugated layer. In double face
stock, the corrugations are fixed both to the inside face
of the outer layer and the inside face of the inner layer.
Foamed stock is essentially of the same types as dis-
cussed above, but the "corrugated" layer is a foamed
plastic.

In the manufacture of shipping cartons, it is common
to use double face stock, as opposed to single face stock,
at the present time, and thus the use of the term "corru-
gated shipping" carton normally means a carton formed
of "double face stock."

A blank of such stock is customarily scored to provide
a rectangular carton for example, so that four side wall
sections are defined on the blank with foldable flaps pro-
jecting from opposite ends thereof. The so-called flaps
are of the same thickness as the wall sections, and could
be more aptly defined as end wall panels. The side wall
sections of a blank of the above described type are suc-
cessively integrally joined to adjacent sections, but the
"outside" sections have free ends, and these free ends are
joined together by a suitable manufacturer's joint. After
such joining, the so-called flaps project above and below
the side wall sections, but thereafter, the flaps are folded
inwardly so as to form the top and bottom walls of the
carton. The flaps in this type carton, as well known to
those of ordinary skill in the art, are each adapted to
cover one-half of an end opening. Normally, to afford
the necessary strength for the carton, a pair of flaps from
opposed side walls overlap a pair of flaps from the op-
posite pair of opposed side walls whereby the top of the
carton comprises two flaps having a joint therebetween
running in one direction and overlying two flaps having
a joint running therebetween in a direction perpendicu-
lar to the joint between the first mentioned pair of flaps.
Of course, the opposite end wall of the carton also com-
prises two pairs of flaps, the joint between each pair run-
ning in an opposite direction to the joint between the
other pair.

With the construction described in the preceding para-
graph, which is conventional and most widely used today,
the side walls of the carton normally comprise a single
layer of double face corrugated paperboard, and the end

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walls of the carton comprise double layers of double face
corrugated board by virtue of the overlapping relation
between the folded-over flaps.

Sealing of such a carton for shipping purposes may be
achieved in various ways. For example, in some cartons,
the final sealing is achieved by using an adhesive which
fixes the top of the first pair of inwardly folded flaps to
the underside of the second pair of inwardly folded flaps
at each end of the carton. In other instances, the flaps
are folded inwardly in the manner described above, and
a piece of gummed-tape, or the like, is placed over the
joint on the outside of the carton and adhered to por-
tions of opposite side walls thereof.

Corrugated paperboard cartons formed in the afore-
said manner and sealed in the conventional ways de-
scribed, generally have proved satisfactory as far as
strength is concerned, but the center of the end walls is
a "weak spot." Moreover, leakage from such cartons by
finely ground material exists under certain conditions due
to ineffective edge sealing, and thus normally where
finely ground material is to be shipped in cartons of any
size, the same is first placed in a plastic container, such
as a polyethylene bag, and then the bag is inserted in
the corrugated carton.

Foamed stock, in contrast with conventional single and
double-face stock, is just coming into use, and has not
found widespread use due to its present cost.

Having now set forth the general background in the
corrugated paperboard art, attention can be more spec-
ifically directed to the instant invention which has as
its primary object the provision of an improved form of
corrugated paperboard carton which not only is free of
the disadvantages listed above, but which also results in
a substantial material saving.

More specifically, primary objects of the present in-
vention are to provide an improved form of paperboard
carton (a) which possesses strength properties at least
comparable with those of a conventional carton while
providing a substantial saving of material over such
cartons, (b) which possesses improved sealing character-
istics, (c) which in addition provides for extreme con-
venience in handling, fabrication, and use, and (d) which
makes the use of "foam" shock practical from a cost
standpoint.

Still a further, yet important, and primary object of the
present invention is to provide a new form of corrugated
carton which comprises a blank forming side walls there-
of, and a pair of end panels cooperating with the side
walls and fixed thereto by flexible comparatively narrow
sealing flaps extending from the side walls. In this con-
nection, and more particularly, an object of the present
invention is to provide a new form of corrugated paste-
board carton which eliminates the need for overlapping
flaps forming opposite ends thereof, and yet provides for
satisfactory, and, in fact, improved strength properties.

Even further, and additionally, a primary object of the
present invention is to provide an improved carton formed
from corrugated paperboard, which carton can satisfac-
torily comprise side wall portions made of single face
stock.

While one of the important features of the invention
lies in providing an improved carton having side walls
formed from single face corrugated stock, it is to be
understood that the invention can be used with substantial
material saving advantage when double face stock is em-
ployed in the formation of the side wall portions of the
carton and that the invention finds particular advantage
in this respect also when foamed stock is used in forma-
tion of a carton constructed in accordance herewith.
Thus, the primary aspects of the invention lie in the pro-
vision of a new form of carton, and while the ability to
form the side wall portions, thereof from single face stock

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is an advantage afforded hereby, such advantage is not to the exclusion of advantages provided when double face stock and/or foamed stock is used.

Aside from the material saving advantages offered by the instant development, the invention has as a still further object the provision of a carton which can be easily opened by the normal user. In this connection, an important feature of the invention lies in the provision of a carton incorporating a "tear strip" extending within and around either the upper or lower periphery thereof whereby the carton can be opened easily by a user upon pulling of the tear strip so as to sever a seam about the top or bottom periphery of the carton. More specifically, in this regard, an object of the present invention is to provide such a carton incorporating such a tear strip wherein the tear strip need only sever a comparatively thin wall portion or seam covering in order to open the carton.

In addition to all of the above, an important and auxiliary object of the present invention is to provide a carton conforming with all of the preceding objects, which carton can be comparatively easily formed on mass production type equipment—i.e., which carton can be formed from continuous blank material. Specifically, in connection with formation, the invention has as one of its objects the provision of methods for forming a carton in accordance herewith, which methods are adapted to mass production techniques, and an operation of generally continuous nature whereby normal scoring rolls and the like can be used in the formation.

Certain objects in addition to those set forth hereinabove are also of general importance, such as, for example the provision of a carton which is moisture proof, the provision of a carton which is insect proof, the provision of a carton wherein the contents thereof, if mar-
rable, are protected from damage, wherein effective seals at all lines of juncture are provided to prevent leakage, and possibly most important, wherein all of the aforesaid objects can be achieved at a substantial saving in material.

Even further, a primary object of the present invention is to provide an improved carton construction which permits the use of foamed stock while at the same time utilizing a minimum quantity of material to achieve satisfactory strength properties. Specifically, in this connection, a further important object hereof is to provide a carton formed from foamed stock and having specially designed side walls which minimize material requirements.

The aforesaid primary or main objects, as well as the auxiliary objects discussed above, are broadly achieved by providing a cardboard carton casing having side and end walls wherein the side walls are formed from a blank having a corrugated or filled layer and also having integral marginal flaps projecting from the top and bottom ends thereof. The flaps have a thickness of only a minor fractional part of the thickness of the side walls, and are comparatively narrow. Preferably, the flaps extend contiguous to the outer face of the sidewalls and the corrugating or fill layers on the side walls define top and bottom inner peripheral shelves within the confines of the flaps adjacent the junctions of the flaps with the side walls. In the carton, the end walls are formed from a pair of planar panels, preferably of double face or foam filled corrugated stock, supported at their peripheral edges respectively on the top and bottom peripheral shelves defined by the corrugating layer on the side walls. The flaps extending integrally from the side walls are folded over and secured to the outer peripheral edge portions of the outer face of the panels forming the end walls. Thus, the end panels are solid throughout the area which they cover and the central weakness of the end walls in a normal carton is eliminated. Moreover, only a single layer of stock is needed for each end wall. Additionally, with the construction of this invention, all seams are formed about the periphery of the carton, and are "leak proof." Still further, preferably a tear strip is provided

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which extends about the junction of the top flaps with the side wall panels, whereby when the tear strip is pulled the same merely severs the flap, thereby freeing the top panel. The "corrugated layer" as suggested may be either conventional corrugations or foam.

It is to be here understood that the terms "corrugated layer," "corrugating layer," and "fill layer" as used in this specification mean a layer formed of ruffled or undulated paper, or a layer formed of a foamed plastic, such as, for example, foamed polystyrene, and unless otherwise indicated, such terms are not intended to be limited to either form of layer.

The invention will be better understood, and objects other than those specifically set forth above will become apparent when consideration is given to the following detailed description. Such description refers to the annexed drawings presenting preferred and illustrative embodiments of the invention, and wherein:

FIGURE 1 is a perspective view of a partially formed carton constructed in accordance with the present invention, and shows the constituent parts of such carton;

FIGURE 2 is a plan view, partially broken away, of a blank utilized in the formation of the carton shown in FIGURE 1;

FIGURE 3 is a plan view of a modified form of blank utilized to construct a carton formed in accordance with the instant invention;

FIGURE 4 is also a plan view of a still further modified form of blank which can be used in the formation of a carton in accordance herewith;

FIGURE 5 is a fragmental detailed sectional view of the upper peripheral portion of a carton formed according to this invention, and presents the cooperation between a side wall portion, and an end panel incorporated therein;

FIGURE 6 is a fragmental detailed perspective view of the top portion of a carton formed from blank shown in FIGURE 4;

FIGURE 7 is a plan view of a still further modified form of blank which can be utilized to construct a carton in accordance with the instant invention;

FIGURE 8 is a plan view of the underside of a blank such as shown in FIGURE 2;

FIGURE 9 is a perspective view of a modified form of carton constructed in accordance with the present invention;

FIGURE 10 is a plan view of a corner section of a finished carton formed from a blank such as shown in FIGURES 2 and 8;

FIGURE 11 is a plan view of a corner section of a finished carton formed from a blank such as shown in FIGURE 4;

FIGURE 12 is a plan view of a corner section of a finished carton formed from a blank such as shown in FIGURE 3;

FIGURES 13 and 14 are fragmental detailed sectional views presenting the preferred disposition of tear strips incorporated in cartons constructed in accordance herewith;

FIGURE 15 is a fragmental detailed sectional view of a modified form of the invention wherein a protective coating is applied to the tips of corrugations so as to prevent marring of contents within a carton formed in accordance with this invention;

FIGURE 16 is a fragmental sectional view of the end portion of a wall section and associated flap, FIGURE 16 presenting the form of flap utilized in the modified carton of FIGURE 9;

FIGURE 17 is also a fragmental elevational view of the end portion of a wall section and associated flap, but FIGURE 17 presents the form of flap utilized in the modified carton of FIGURE 6;

FIGURE 18 is a plan view of a foam filled blank adapted to be used in formation of a carton in accordance with the invention;

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FIGURE 19 is an end view of the "foam filled" blank of FIGURE 18; and,

FIGURE 20 is an end view of a carton constructed from a foam filled stock blank such as shown in FIGURE 18.

Reference is now made more specifically to the drawings for purposes of explaining the detailed aspects of the instant development. Initially, consideration is given to the invention as applied to conventional paperboard corrugated stock, and thereafter the invention is discussed as applied to foam filled stock.

Basic Corrugated Paperboard Stock Embodiment

In FIGURE 1, the component parts of a corrugated paperboard carton constructed in accordance with this invention are shown. By referring to such figure, it will be noted that the cardboard carton casing is therein generally designated by the numeral 2 and is shown as having side walls 4, 4a, 4b, and 4c. The side walls are formed from a corrugated blank, as explained more fully below, and this blank has integral marginal flaps 6 and 8 projecting from the top and bottom ends of the side walls. The corrugations 10 on the blank extend at least substantially perpendicular to the ends of the casing, and the flaps 6 and 8, as also explained more fully below, have a thickness of only a minor fractional part of the thickness of the side walls. As shown, the flaps 6 and 8 extend continuous to the outer face of the sidewalls whereby the corrugations define top and bottom inner peripheral shelves 14 within the confines of the flaps and adjacent the junctions of the flaps with the side walls.

The end walls of the carton are formed from a pair of planar panels 16 and 18. These panels, in ultimate formation of the carton, are supported at their peripheral edges respectively on the top and bottom of peripheral shelves 14, and then the flaps 6 and 8 are folded-over and secured to the outer peripheral edge portions of the outer faces of the panels 16 and 18. A completed box constructed in accordance herewith is shown in FIGURE 9, and by reference to such figure, it will be noted that the ends of the carton are defined solely by the panels with the flaps folded thereover. Actually, the carton shown in FIGURE 9 is formed in accordance with a modification of the invention, but the general construction is identical to that described hereinabove.

The blank which is used to form the carton 2 shown in FIGURE 1, or at least the side wall portions thereof is presented in FIGURE 2. This blank comprises a generally rectangular piece of single face corrugated stock, which can be provided with transverse score lines 5, 5a, and 5b which separate the overall blank into wall sections 4, 4a, 4b, and 4c. The score lines 5, 5a, and 5b are not essential, single face stock being easily foldable as required without score lines. However, when the score lines are provided, they extend parallel to the longitudinal axis of the corrugations 10, and with the score lines, the blank can be easily folded into rectangular form as shown in FIGURE 1. The free edges 7 and 9 of the respective sections 4 and 4c are joined together by any suitable manufacturer's joint, which in the embodiment shown in FIGURE 1 comprises a corner tape 20 overlapping the respective free end portions of the sections 4 and 4c so as to maintain the edges 7 and 9 in fixed relation.

It is to be understood that while a stitch type joint 20 is shown, any suitable manufacturer's joint may be used for the corner connection without departing from the scope and spirit of the invention. Various manufacturer's joints are in use today, and it seems unnecessary to specify this particular joint in detail.

The reverse side of the blank shown in FIGURE 2 appears substantially as shown in FIGURE 8. By reference thereto it will be noted that the corrugations 10 are part of a ruffled inner layer generally designated by numeral 30 which is fixed to an outer layer 32. In other words, the blank shown in FIGURES 2 and 8 takes basi-

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cally the form of standard single face corrugated stock, including a planar outer facing layer 32 having the ruffled or corrugated inner layer 30 affixed thereto. Corrugating machines to make this type of basic construction are well-known, and in accordance with this embodiment of the invention, any such machine can be used. However, some modification thereto may be required since the corrugated stock as shown in FIGURES 2 and 8 is not per se of conventional design. By reference to FIGURE 8 it will be noted that the corrugation layer 30 terminates in spaced relation widthwise to the edges of the outer facing layer 32. Specifically, the corrugating layer 30 covers only the central portion of the outer facing layer 32 whereby the outer facing layer 32 extends beyond the central portion on opposite sides of the blank, thus providing the marginal flaps 6 and 8.

By virtue of such construction, when the blank shown in FIGURES 2 and 8 is formed into a casing as shown in FIGURE 1, the ends 36 and 38 of the corrugations define a peripheral inner shelf extending about the top and bottom of the casing tube. The tabs or flaps 6 and 9 project beyond this shelf and contiguously with the outer face 32 by virtue of the fact that they are integral with such outer face. Accordingly, the panels 16 and 18 can be inserted, and are inserted in accordance with the invention, whereby their peripheral edge portions engage or rest on the peripheral shelves 14. This construction is possibly best shown in FIGURE 5 wherein the panel 16 has an end portion generally designated as 16a resting on the top of a corrugation 10 of layer 30. The outer facing layer 32 of the blank which has the flap 6 extending integrally thereabove is shown as folded-over the outer face of the panel 16 and is secured in position by a suitable adhesive. In the embodiment of FIGURE 8 the tabs 6 and 8 carry an adhesive 31 thereon of the pressure sensitive type whereby when the flaps are folded-over, they immediately stick to the outer face of the panels 16 and 18. However, it will be understood that pressure sensitive adhesive need not be used, and that a normal manufacturing glue can be provided on the flaps 6 and 8 at the time desired. The preferred embodiments however, contemplate using pre-applied pressure sensitive adhesive, or pre-applied water soluble adhesive.

As shown in FIGURES 5, 8 and 13, a tear cord 34 is disposed at the junction between the ends of the corrugations 10 and the flap 6—i.e., the tear strip or cord 34 lies adjacent the end of the corrugations 10. Thus, when the carton is formed as shown in FIGURE 1, the tear strip surrounds the upper periphery of the carton adjacent the lower side of the panel 16, and in order to open the carton, after the same has been sealed, it is only necessary to pull the tear strip thereby severing the flap 6 about the periphery of the carton, thus freeing the top panel 16 for removal. Of course, if desired, the tear strip can be positioned to free the bottom panel, or top and bottom tear strips can be incorporated whereby either or both panels can be easily detached.

The preferred embodiment of the invention presented in FIGURE 1, and described hereinabove, allows for a substantial saving in material used. As compared with a conventional carton, such as described at the outset of this specification, the embodiment of FIGURE 1 eliminates the need for two plies of "double face" material at the ends of the carton, as well as the need for "double face" stock forming the side walls thereof. The first of these advantages is present in any carton formed in accordance with the instant invention, but as more fully explained below, the invention contemplates utilizing double face stock and foam filled stock for the side wall portions if desired. Still, the material saving in requiring only one layer of double face stock in the formation of the ends of the carton is, itself, significant. It is to be noted in this regard that the flaps or tabs 6 and 8, which extend from the side walls and serve to secure the end panels in position, incorporate a comparatively minor

quantity of material as compared with the material utilized in the flaps of a normal or conventional carton. Moreover the end flaps used in this invention, in most instances, eliminate the need for the utilization of extra tape in the sealing operation.

As suggested above, with the embodiment of FIGURE 1, the tabs 6 and 8 are formed as part of the outer layer of the corrugated stock itself. This means that the marginal edges of the carton at the top and bottom are covered only by such outer layer, yet it has been found that with this construction the carton possesses adequate strength properties, since peripheral edges of the panels 16 and 18 rest on the ends of the corrugation 10 so that there is definite support for such panels.

Modified Corrugated Paperboard Stock Embodiments

While the embodiment described above constitutes the preferred embodiment hereof, the formation of the blank 2, whereby it appears as shown in FIGURES 2 and 8, may present some problems. Specifically, in such embodiment, the corrugated layer 30 is disposed centrally of the outer layer 32, and thus during the forming operation, some guide must be used so as to maintain the corrugations 30 properly spaced inwardly of the longitudinal edges of the outer layer 32. The alignment between the corrugated layer 30 and the outer layer 32 must be exact, as otherwise the proper dimensional relationship will not be existent as required for ultimate formation of the carton.

In addition to the controlled spacing required with the embodiment of FIGURE 1, forming the corrugated stock, in accordance with FIGURES 2 and 8, presents some problem. Normally, conventional corrugated paperboard stock is formed by pulling an outer layer from one supply roll and the corrugated layer from another supply roll, and passing the same continuously under or over a corrugation roller. Since the corrugation layer 30 must be centrally disposed on the outer layer 32 to form the construction of FIGURES 2 and 8, a continuous mass production technique would require either forming one carton at a time on a single apparatus, or alternately, using a wide outer layer 32, and a plurality of corrugation supply rolls and layers spaced horizontally apart so as to be fixed to the outer layer with spaces between the respective corrugation layers so that the final formations could be severed in the spacing between adjacent corrugation layers to provide the necessary blanks. Both of these operations are inconvenient, since with a narrow carton the normal machinery is not utilized to its fullest extent, and since the provision of separate layers of corrugations of the desired width requires extra work.

To overcome the aforesaid possible disadvantages, a modified embodiment of the invention contemplates formation of the flaps 6 and 8 by a corrugation crushing operation. Specifically, as opposed to utilizing a centrally disposed corrugation layer 30 with a wider outer layer 32 as shown in FIGURE 8, in accordance with this modification, the corrugating layer 30 is coextensive with the outer layer 32, for example, as shown in FIGURE 4. However, the portions of the blank of FIGURE 3 which form the respective flaps 6A and 8A are crushed, as shown in FIGURE 17. By referring to FIGURE 17, it will be noted that the corrugation layer 30A extends to the edge of the outer layer 32A, but that the corrugations are crushed so as to form a flap 8A comprising the outer layer 32A and the overlying crushed corrugations at the end of the corrugation layer 30A. Of course, the complete blank has crushed corrugations at opposite ends thereof.

The aforesaid crushing can be achieved by merely placing crushing rolls in the desired position along the path of movement of corrugating material being continuously formed on a conventional corrugating machine. In other words, a normal corrugating machine can be used to form single face stock, and in advance of the position where the corrugating is performed, a pair of cooperating rollers

are provided to push together opposite sides of the stock along desired areas of its length. The rollers are of a width corresponding to either the width of a single flap or double such width, whereby blanks formed in accordance with the invention can be subsequently severed medially of the double width crushed portion to provide a usable blank having a single width crush at opposite longitudinal edges thereof.

The crushed marginal edge construction, or crushed flap construction, referred to hereinabove, can possibly be best appreciated by reference to FIGURE 6, wherein the top portion of a carton formed in accordance with this modification is presented. In this figure, the carton is generally designated by the numeral 2' and the top peripheral shelf formed by the ends of the corrugations is designated as 14'. It will be noted that this shelf corresponds identically with the shelf 14, but as opposed to having the corrugations 10 terminate adjacent the shelf, in the embodiment of FIGURE 6, the corrugations are crushed thereadjacent. Still, however, a shelf is provided on which the peripheral edges of the top and bottom panels 16 and 18 can rest and be supported.

The blank shown in FIGURE 4 corresponds substantially identically with the blank described in connection with FIGURES 2 and 8. However, as opposed to merely being provided with slits 50 extending from opposite ends of the score lines 5, 5A and 5B, this blank is provided with V-shape cutouts 52, having their apexes facing opposite ends of the respective scores 5', 5A' and 5B'. Additionally, as noted above, this blank includes corrugations extending through the respective peripheral edges of the outer layer 32A, and the longitudinal edge portions are crushed in the manner described above. The formation of the ultimate carton, however, is substantially identical with the formation described in connection with FIGURE 1. The free edges 7' and 9' of the blank of FIGURE 4 are joined by any suitable manufacturer's joint, and thereafter end panels 16 and 18 are inserted at the respective open carton ends whereby the peripheral edge portions of such panels rest on the shelves formed by the crushed corrugations. Thereafter, the respective sections of the flaps 6 and 8, defined by the cutouts therebetween, are folded-over and secured to the panels 16 and 18, or specifically the outer faces of such panels. Of course, if desired, a suitable adhesive can be provided on the crushed corrugations so that the same are secured in place—i.e., the blank of FIGURE 4 can be provided with a pressure sensitive adhesive just as the blank in FIGURE 8 is so provided. Alternatively, a suitable glue can be used on the crushed corrugations for purposes of securing the same to the outer face of the panels, thereby securing the panels in place and sealing the carton.

While not specifically shown in connection with the modified embodiment described above, it is to be understood that a tear strip or cord can be provided in this embodiment and if so provided, such tear strip or cord extends adjacent the junction of the crushed corrugations at one end, and the uncrushed portions thereof—i.e., along the junction between the side wall panels per se and the flaps per se. The junction in the embodiment of FIGURES 4 and 6 coincides with or is coaxial with the longitudinal score lines 56 and 58. These score lines are incorporated so as to facilitate folding of the flaps 6' and 8' in the ultimate carton formation.

As further suggested hereinabove, as opposed to using "single face" stock, with or without the crushed corrugations forming part of the foldable flaps, the carton provided hereby can be formed from double face stock—i.e., stock wherein the corrugations are sandwiched between an inner and outer layer. FIGURE 3 presents a blank wherein double face paperboard stock is used in the formation of the side wall sections of the carton. By referring to such figure, it will be noted that the outer layer thereof is designated by the numeral 60 and the inner layer thereof is designated by the numeral 62. Disposed between the

outer and inner layers is the corrugation layer 64. In this particular embodiment, the corrugation layer 64 and inner layer 62 extend over only the central portion of the outer layer 60. In other words, the blank of FIGURE 3, in this regard, corresponds to the blank of FIGURES 2 and 8 with the exception that the corrugation layer is covered with an inner layer of material. The same construction would result from providing an inner layer fixed to the corrugations 39 of FIGURE 8. To simplify explanation, and cover the various modifications, the blank of FIGURE 3 is shown as provided with a slightly different type of scoring on the flaps per se, the purpose of which will be described more fully hereinafter.

Notwithstanding the above differences, the blank of FIGURE 3 is formed into a carton in substantially the same way as the cartons of FIGURES 1 and 6. When the blank of FIGURE 3 is folded so that the free edge portions 69 and 71 thereof are in juxtaposition a suitable manufacturer's joint is provided along such free edges, and the carton generally defines a rectangular body open at both ends. Thereafter, panels such as those designated by numerals 16 and 18, are inserted so as to rest on the ends of the corrugations 64 in this instance and the flaps 68 and 70 are folded-over, in the manner explained below, to secure the end panels 16 and 18 in position.

Since the construction of FIGURE 3 is subject to certain difficulties in formation, similar to those discussed in connection with blank 3 of FIGURES 2 and 8, a further embodiment of the invention contemplates using double face stock, wherein the corrugating layer and the inner layer are coextensive with the outer layer. This modification is best presented in FIGURE 7, wherein the blank is shown as comprising an outer layer 80, a layer of corrugations 82, and an inner layer 84, all of which are coextensive. In this embodiment, as should be apparent, in order to obtain the flaps as required by the instant invention, the end portions of corrugations 82 are crushed. Thus, the flaps 86 and 88 comprise inner layers constituting the edge portions of inner layer 84, and outer layers constituting the edge portions of the outer layer 80, with crushed corrugations therebetween. It may be desirable, in this instance, to cut the inner layer 84 and the corrugations, without cutting the outer layer 80, so as to permit the crushing operations. Still, in this embodiment the ultimate carton is formed in a generally similar manner to the formation of the cartons described above. This modification, like the other modifications suggested above, all eliminate the double pair of large folded-over flaps as used in conventional carton, and in effect substitute for such construction an end panel adapted to be secured in position by comparatively narrow marginal flaps extending from opposite ends of the side wall sections of the carton.

FIGURE 9 is representative of a carton constructed in accordance with the aforesaid modifications, or any one of them, with the exception of that presented in FIGURE 3. By referring to FIGURE 9, it will be noted that the flaps shown therein designated as 68 or 86 are folded-over the marginal or peripheral edge portions of the panel 16 to secure the same in position. In addition, however, in FIGURE 9, the carton is shown as being provided with a reinforcing strip 100 which covers the flap (68 or 86) as well as a narrow adjacent portion of the side wall there designated as 4'. A reinforcing strip 100, in actual use, would extend entirely about the top and bottom periphery of the carton, if desired, to provide increased support for the carton adjacent and folded-over marginal flaps. The reinforcing strip can comprise any suitable form of strip, including gummed paper, and in many instances is not required at all.

While the blanks shown in FIGURES 2 through 8, inclusive, have all been described as forming generally the same type of carton, it will be noted that the blank of FIGURE 3, for example, includes score lines 102, 202' and 104, whereas, the blank of FIGURE 2 includes slits

50 and the blank of FIGURE 4 includes V-shape cutouts 52. Moreover, it will be noted that the blank of FIGURE 7 includes V-shape cutouts 106 as well as score lines 108 extending from the longitudinal score lines 110 and 112 to the apex of V-shaped cutouts 106. These various forms of scorings or cuts in the flaps are important in particular instances.

When the blank of FIGURE 2 is utilized in an ultimate carton, the corners appear as shown in FIGURE 10. Adjacent sections of the flap 6, for example, are folded-over so that the corners appear square with the end portion 6' shown in FIGURE 10 overlapping the corresponding end portion of the section 6''. This construction provides a tight seal at the corners, but a somewhat more effective and tighter seal can be achieved with the construction of the blank of FIGURE 3. In this instance, no cuts are provided in the flaps but instead the same are scored along lines 102, 102' and 104, whereby in the ultimate formation, the score lines 102 and 102' permit an overlapping joint as shown in FIGURE 12, in the corner of the final carton.

A still further modification lies in the V-shape cutouts of FIGURE 4 which have their apexes meeting the ends of the transfer score lines defining the respective wall sections of the blank. In this instance, while sealing is facilitated, the corner appears as shown in FIGURE 9 with a slit 114 extending between the inner edge of the flap and the outer edge thereof diagonally across the corner. This particular corner has been found to have less effective sealing properties than the corner of FIGURES 10 or 12, but this corner does possess certain advantages as to ease in the folding operation.

The blank of FIGURE 7 results ultimately in a corner construction similar to that of the blank of FIGURE 4. However, with the blank of FIGURE 7, the slit 114 as shown in FIGURE 11, does not extend to the edge of the corner seam, but instead, extends only partially to such corner, thereby providing an effective tight seal at the corner, while still permitting ease in ultimate folding of the flaps.

In certain instances, cartons of the aforesaid type, are adapted to contain objects having marable surfaces. When single face corrugated stock is used, the corrugations would tend to press against such surfaces and thereby possibly causes a mar therein. Accordingly, in order to eliminate any such marring, preferably, the inner tips of the corrugations are provided with a waxed coat 106 as shown in FIGURE 15. Here, the corrugations are designated by the numeral 10 and are shown as fixed to the outer layer 32 of the corrugated stock. Wax tips can be easily incorporated on the corrugations by utilizing a roller saturated with wax and adapted to pass over such tips so as to apply the coating in the manner shown. Although wax tipping has been specifically suggested above, it will be understood that tipping with other suitable material such as, for example, polyethylene, can be used.

Foam Filled Stock Embodiment

Although attention has been directed hereinabove to the invention as applied to cartons formed from conventional types of corrugated paperboard stock, as indicated at the outset of this specification, the invention is also applicable with advantage to foam filled stock. As well known to those in the art, foam filled stock is in essence quite similar to double face paperboard stock. However, as opposed to having a ruffled or undulated paper layer sandwiched between its inner and outer facing layers, the foam filled stock has a layer of plastic foam sandwiched between inner and outer facing layers.

The foam layer of foam filled stock corresponds in function to the corrugated or ruffled layer of conventional paperboard stock, and thus in the instant specification and the appended claims, the terms "fill layer," "corrugating layer," and "corrugated layer" have been used somewhat interchangeably to identify that layer of stock which

serves to separate the inner and outer facing layers, and give body to a blank end or carton formed from the stock.

As explained more fully in the immediately following paragraphs, the basic aspects of the invention are the same when utilized in connection with foam filled stock or conventional paperboard stock. However, as indicated above, the invention is of particular significance when foam filled stock is used, as in this instance, the invention makes the use of foam filled stock practical from the cost standpoint.

In FIGURE 18, a carton forming blank constructed in accordance with the invention is shown as the same would appear when viewed directly down on the inner facing layer. The blank, which is designated generally by the numeral 150, comprises an inner facing layer 152, an outer facing layer 154, and a plastic foam fill layer 156. The foam fill layer can be formed of any suitable foamable plastic, such as, for example, foamable or foamed polystyrene.

In the embodiment presented in FIGURE 18, the outer facing layer 154 is wider than the inner facing layer 152 and wider than the foam fill layer 156. The foam fill layer 156, however, is coextensive with the inner facing layer 152. Thus, in essence, the blank of FIGURE 18 is essentially of the same form as the blank of FIGURE 3, except that the corrugated layer 64 of FIGURE 3 is formed from a foamed plastic in the embodiment of FIGURE 18, as opposed to being formed from a ruffled or undulated paper such as used in the embodiment of FIGURE 3.

As shown in FIGURES 18 and 19, marginal flaps 158 and 160 having a thickness of only a minor fractional part of the thickness of the central portion of the blank extend contiguous with the outer facing layer 154 thereof so as to project from the top and bottom ends of the blank. From FIGURE 19, it should be apparent that the top and bottom ends 156A and 156B of the foam fill layer 156 define, in the ultimate carton formation, peripheral shelves such as those designated by the numerals 14 and 14' in FIGURES 1 and 6 respectively.

FIGURE 20 presents in cross section a carton constructed in accordance with the invention wherein foam filled stock is used. By reference to this figure, it will be noted that the carton, generally designated by the numeral 162, has side wall portions formed from the blank 150. The side wall portions comprise the outer facing layer 154, the inner facing layer 152, and the foam fill layer 156. Of course, the foam fill layer is integrally bonded with the inner and outer facing layers as is conventional in the fabrication of foam filled stock. The closing end panels of the carton of FIGURE 20 are formed from foam filled stock also, but these end panels are in essence substantially the same as the end panels shown in FIGURE 1 and designated by the numerals 16 and 18. Here again, the difference between the FIGURE 1 construction, and the FIGURE 20 construction, lies in the fact that the fill layer of the stock is formed of a foamed plastic as opposed to being formed of a corrugated or ruffled paper.

Quite naturally, the invention contemplates sealing the carton of FIGURE 20 in the same manner that other cartons discussed above are sealed. The folded-over end portions of the flaps 158 and 160 can be secured in place by a water soluble adhesive, or by a pressure sensitive adhesive, or by any other suitable means. Moreover, a pressure sensitive adhesive may be applied to the flaps initially, if desired, and the flaps may be scored in any manner discussed above so as to facilitate the sealing.

The blank of FIGURE 18 has been shown as scored along the lines 180, 180A, and 180B, so as to permit folding of the blank into a generally rectangular carton. While straight score lines have been shown, as suggested in the preceding paragraph, varying forms of scores, and/or cutouts, may be provided at the lines where a fold is desired so as to facilitate ultimate fabrication

of the blank into a carton. Thus, as should be appreciated, the modifications suggested in connection with FIGURES 3, 4, 7, and 8 as to scoring and/or cutouts are applicable to the blanks shown in FIGURE 18.

Notwithstanding the fact that the carton of FIGURE 20 has been discussed as being generally formed from a foam filled blank, and notwithstanding the fact that such carton could be formed from such a blank where there was no variation in the thickness of the side walls thereof, the preferred embodiment of the invention as applied to foam filled stock contemplates forming the side walls thereof with a varying thickness. More specifically, as shown in FIGURES 18 through 20, the foam fill layer 156 is preferably made with end portions 190 and 191 that are slightly thicker than the intermediate or central portion 192. To achieve this result, the foam is merely extruded as a strip having enlarged ends, and preferably the ends taper into the central portion as shown. This construction permits the saving of material in that it eliminates any substantial thickness in the center area of the side walls. By enlarging the end areas thereof which extend adjacent and parallel to the projecting flaps, the peripheral shelves formed in the ultimate carton, which support the end panels are made of a desirable and necessary width, but the strength afforded by the foam fill is fully utilized without a waste of material. In other words, the foam fill adds support to a conventional blank, or over a conventional blank, and thus the side walls can be somewhat thinner. At the same time, to achieve the desirable end support for the closing panels 170 and 172, in accordance with the preferred embodiment under consideration, the side wall portions are enlarged in bands extending about their ends so as to yield a full supporting shelf for the end panels. To phrase the results achieved another way, the enlarged end foam fill sections afforded maximum bearing at lowest cost.

The inner facing layer 152 can be easily applied over the foam fill layer 156 after the foam fill layer has been extruded with the portions of varying thickness. Thus, placing the inner facing layer in position as shown in FIGURES 18 through 20 does not create any particular problem.

While a double facing layer foam filled stock has been shown in FIGURES 18 through 20, it will be understood that in certain instances it may be found desirable to eliminate the inner facing layer, and the invention contemplates this modification. Moreover, in other instances, it may be found that the foam fill layer can be crushed in a similar manner to crushing of the corrugations as suggested in connection with FIGURE 17, and thus this modification is also contemplated hereby.

One further point which is to be understood regards the relative dimension shown in FIGURES 18 through 20. The thickness of the side walls has been exaggerated to present the construction, and it is to be understood that the thickness shown does not contemplate making the side walls of foam fill stock any thicker than the side walls which would exist when ordinary or conventional paperboard corrugated stock is used. In fact, when foam stock is used, under certain circumstances, the thickness of the side walls can be reduced due to the additional strength afforded by the foam fill layers.

Having now discussed the various forms which a carton constructed in accordance herewith can take, attention can be directed to general modifications applicable to all of such forms.

General Modification and Conclusions

In addition to all of the foregoing modifications, the present invention contemplates providing a moisture proof or an insect proof box. For this purpose, any of the blanks shown hereinabove, as well as the panels, can be impregnated with a suitable moisture resistant material, or a suitable insecticide or rodenticide. This is somewhat conventional, and it is believed unnecessary to

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describe the impregnating techniques in detail, although it is important to note that the carton provided hereby is readily susceptible to such coating. Further, it is important to understand that the peripheral seals provided by the flaps in the manner aforesaid substantially increase the effectiveness of "moisture proofing," "insect proofing," or like composition.

The various modifications discussed above have been presented in connection with a generally rectangular or parallelogram container for purposes of simplicity. However, as should be readily appreciated by those of ordinary skill in the art, containers formed in accordance with this invention can take any desired shape without departing from the scope and spirit hereof. Moreover, it will be understood that while the invention has been discussed as applied to single and double face paper-board and foam filled stock herein, the same can be applied to double and triple wall stock, combinations of single and double face stock, or other suitable forms of corrugated stock now known or hereafter developed. Similarly, as suggested at the outset of this specification, the tear strip can be applied to foam filled stock although not specifically shown as applied thereto. Moreover, the tear strip 34 can comprise a flat reinforced cord such as that designated by numeral 34' in FIGURE 14. This particular figure shows such a tear strip disposed at the inner end of a crushed corrugation layer 82 which is sandwiched between an inner facing layer 84 and an outer facing layer 80. Specifically, FIGURE 14 shows a transverse cross-section of a blank such as shown in FIGURE 7.

It is believed from FIGURES 6, 14 and 17, the concept of crushed corrugations is apparent. However, FIGURE 16 is included to show this concept further, and by referring thereto it will be noted that the corrugation layer may be double in certain instances.

While specific variations have been explained above, modifications other than those discussed in detail may become apparent to those working in the art. Accordingly, I claim:

1. A shipping carton casing having side and end walls, said side walls being formed from a blank having at least an outer facing layer and an inner fill layer of plastic foam bonded to said facing layer, said blank also having integral marginal flaps unitarily formed therewith and projecting from the top and bottom ends thereof, said flaps having a thickness of only a minor fractional part of the thickness of said side walls and extending contiguous to the outer face thereof, said fill layer having exposed top and bottom edges defining top and bottom inner peripheral shelves within the confines of said flaps adjacent the junctions of said flaps with said side walls, said fill layer having top and bottom edge portions which are thicker than the central portion thereof, said end walls being formed from a pair of planar panels freely supported at their peripheral edges respectively directly and in contacting engagement on said top and bottom peripheral shelves, said flaps being folded-over and secured to the outer peripheral edge portions of the outer faces of said blanks, said flaps extending beyond the top and bottom ends of said blanks by a distance substantially greater than the thickness of said panels and only a minor fractional part of the dimension of said carton in the directions which said flaps respectively extend as folded over, whereby the major portion of said outer faces of each of said panels is exposed.

2. A shipping carton casing having side and end walls, said side walls being formed from a blank having at least an outer facing layer and an inner ruffled layer fixed to said outer facing layer to provide corrugations, the longitudinal edge portions of said ruffled layer being mashed against said outer layer to provide integral marginal flaps projecting from the top and bottom ends of said blank,

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said flaps having a thickness of only a minor fractional part of the thickness of said side walls and extending contiguous to the outer face thereof, said inner ruffled layer having exposed top and bottom edges adjacent the mashed portions thereof and defining top and bottom inner peripheral shelves within the confines of said flaps adjacent the junctions of said flaps with said side walls, said end walls being formed from a pair of planar panels freely supported at their peripheral edges respectively directly and in contacting engagement on said top and bottom peripheral shelves, said flaps being folded-over and secured to the outer peripheral edge portions of the outer faces of said blanks, said flaps extending beyond the top and bottom ends of said blanks by a distance substantially greater than the thickness of said panels and only a minor fractional part of the dimension of said carton in the directions which said flaps respectively extend as folded over, whereby the major portion of said outer faces of each of said panels is exposed.

3. A shipping carton as defined in claim 2 and further including a tear cord disposed along said blank adjacent the junction of one of said flaps with said side walls.

4. A shipping carton as defined in claim 2 wherein said blank is scored perpendicular to the length of said flaps whereby to define side wall sections of said casing, and wherein said flaps are of at least substantially uniform width throughout their length.

5. A shipping carton casing having side and end walls being formed from a blank having an outer paper layer, and a ruffled inner paper layer fixed to said outer layer to define corrugations, said inner layer having less width than said outer layer and being disposed inwardly of the longitudinal edges of said outer layer, said blank also having integral marginal flaps unitarily formed therewith by the longitudinal edge portions of said outer layer, said flaps having a thickness of only a minor fractional part of the thickness of said side walls, and extending contiguous to the outer face thereof, said fill layer having exposed top and bottom edges defining top and bottom inner peripheral shelves within the confines of said flaps adjacent the junctions of said flaps with said side walls, said end walls being formed from a pair of planar panels freely supported at their peripheral edges respectively directly and in contacting engagement on said top and bottom peripheral shelves, said flaps being folded-over and secured to the outer peripheral edge portions of the outer faces of said panels, said flaps extending beyond the top and bottom ends of said blanks by a distance substantially greater than the thickness of said panels and only a minor fractional part of the dimension of said carton in the directions which said flaps respectively extend as folded over, whereby the major portion of said outer faces of each of said panels is exposed.

6. A shipping carton as defined in claim 5 and further including a tear cord disposed along said blank adjacent the junction of one of said flaps with said side walls.

7. A shipping carton as defined in claim 5 wherein said blank is scored parallel to said corrugations whereby to define side wall sections of said carton, and wherein said flaps extend continuously about the top and bottom ends of said blank and are of at least substantially uniform width throughout their length.

References Cited in the file of this patent

UNITED STATES PATENTS

385,726	Reynolds	July 10, 1888
941,256	Jenkins	Nov. 23, 1909
1,480,047	Crowell	Jan. 8, 1924

(Other references on following page)

15

UNITED STATES PATENTS

1,550,646	Larson	Aug. 18, 1925	2,324,757
1,601,547	Wofford	Sept. 28, 1926	2,521,989
1,659,282	Scheffey	Feb. 14, 1928	2,584,336
2,176,284	Whiteford	Oct. 17, 1939	2,857,091
			2,885,073
			3,035,750

16

Botley	July 20, 1943
McPherson	Sept. 12, 1950
Eisenhardt	Feb. 5, 1952
Enzie	Oct. 21, 1958
Bettoli et al.	May 5, 1959
Kauffeld	May 22, 1962